Supplementary Information for

# Miniature Optical Fiber Accelerometer Based on an In-Situ 3D Microprinted Ferrule-Top Fabry–Pérot Microinterferometer

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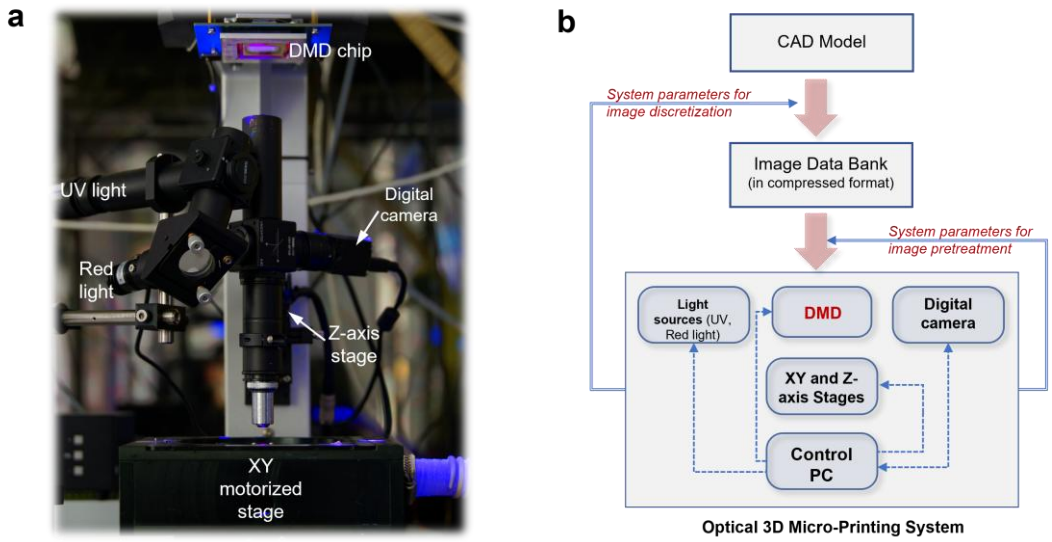


**Fig. S1 a** Photo of our own-built in-situ optical 3D microprinting system. **b** Operation schematic diagram and key components of the in-situ optical 3D microprinting system.

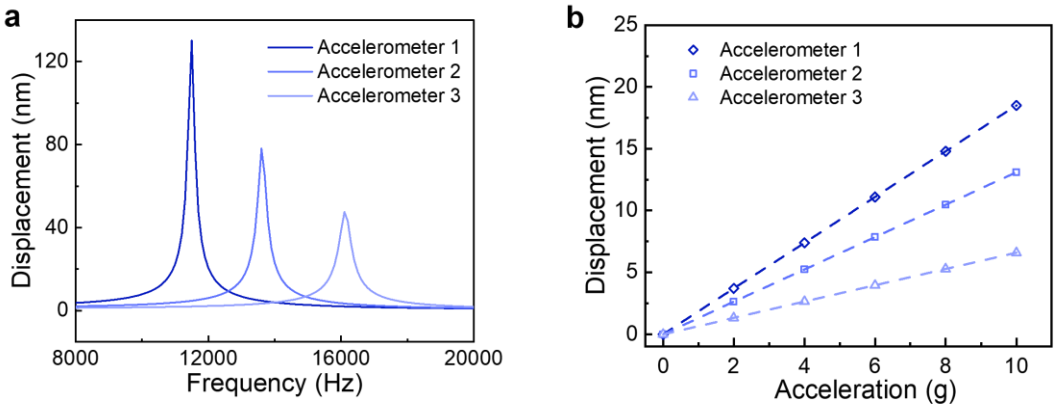


**Fig. S2 a** Numerical simulation results of the frequency responses of the three designed accelerometers. **b** Simulated displacements of the proof mass and reflection mirror of the three accelerometers with respect to acceleration.

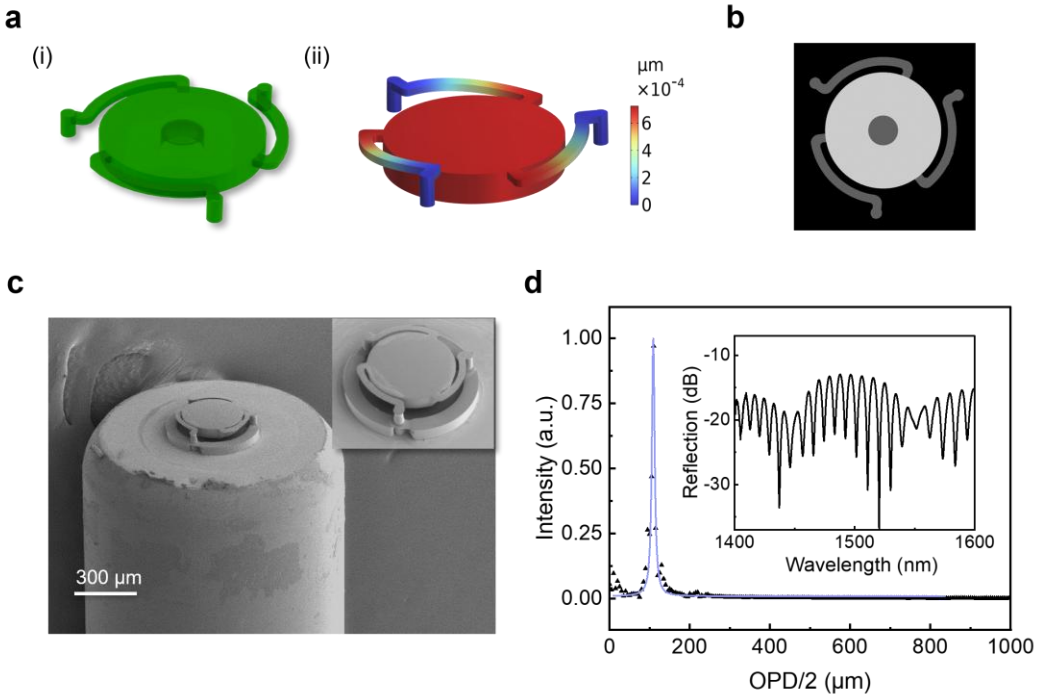


**Fig. S3** Modelling, fabrication, and optical testing results of our third designed accelerometer (i.e., accelerometer 3). **a** (i) CAD model; (ii) Numerical simulation result of the displaced sensor head under 1-g acceleration. **b** Gray-scale pattern for the proof mass, thin-film reflector and supporting microbeams used in optical printing processes. **c** SEM image of a fabricated sensor head. **d** FFT result of the measured reflection spectrum. The inset is the measured reflection spectrums in log scale.

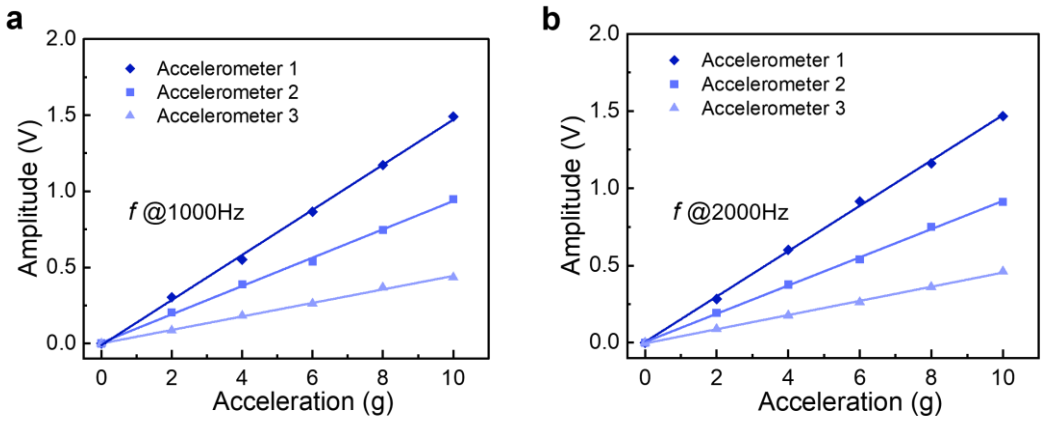


**Fig. S4 a** Measured dependance of the three accelerometers' outputs on the accelerations at the frequency of 1000 Hz. **b** Measured dependance of the three accelerometers' outputs on the accelerations at the frequency of 2000 Hz.

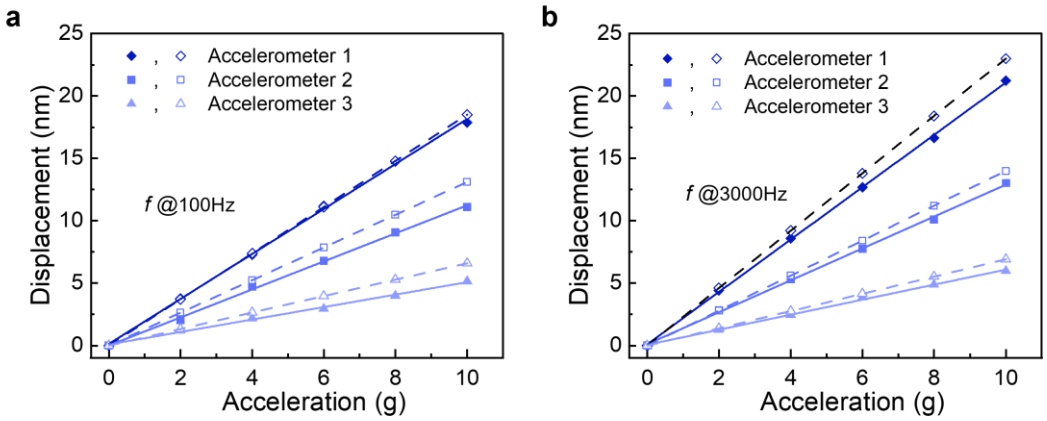


**Fig. S5** A comparison of the displacements of proof mass and reflection mirror (solid line) deduced from the accelerometers' outputs and their optical sensitivities with numerically simulated displacements (dashed line) under 0-g to 10-g acceleration. **a** Comparison at the frequency of 100 Hz. **b** Comparison at the frequency of 3000 Hz.

**Table S1** Comparison between the previously reported optical fiber accelerometers and our work.

| Publication information | Working mechanism | Dimension of sensor head (mm) | Bandwidth | Resolution (μg) /NEA (μg·Hz$^{-1/2}$) | Sensitivity |
|---|---|---|---|---|---|
| Li *et al.*, *IEEE Sen. J.* **22**, 23931 (2022) | FBG-FP | 13×10×5 | 600 Hz | 1500 μg | 27.3 mV·g$^{-1}$ |
| Zhao *et al.*, *J. Ligh. Tech.* **36**, 1562 (2017) | FPI | Φ2.5×5 | 120 Hz | 8.5 μg | 3.86 μm·g$^{-1}$ |
| Wang *et al.*, *Opt. Fib. Tech.* **72**, 102989 (2022) | FPI | Φ25×10 | 300 Hz | 263 μg | 3.81 nm·g$^{-1}$ |
| Zhang *et al.*, Opt. Engi. **57**, 087107 (2018) | FPI | Φ1×2.5 | 1500 Hz | 350 μg·Hz$^{-1/2}$ | 2.9 nm·g$^{-1}$ |
| Bruno *et al.*, *J. Light. Tech.* **38**, 1998 (2020) | FPI | 2×3×3 | 4800 Hz | 101.25 μg·Hz$^{-1/2}$ | 0.98 nm·g$^{-1}$ |
| This work | FPI | Φ0.4×0.1 | 2000 Hz | 62.45 μg·Hz$^{-1/2}$ | 1.8 nm·g$^{-1}$ |